

Water on Mars

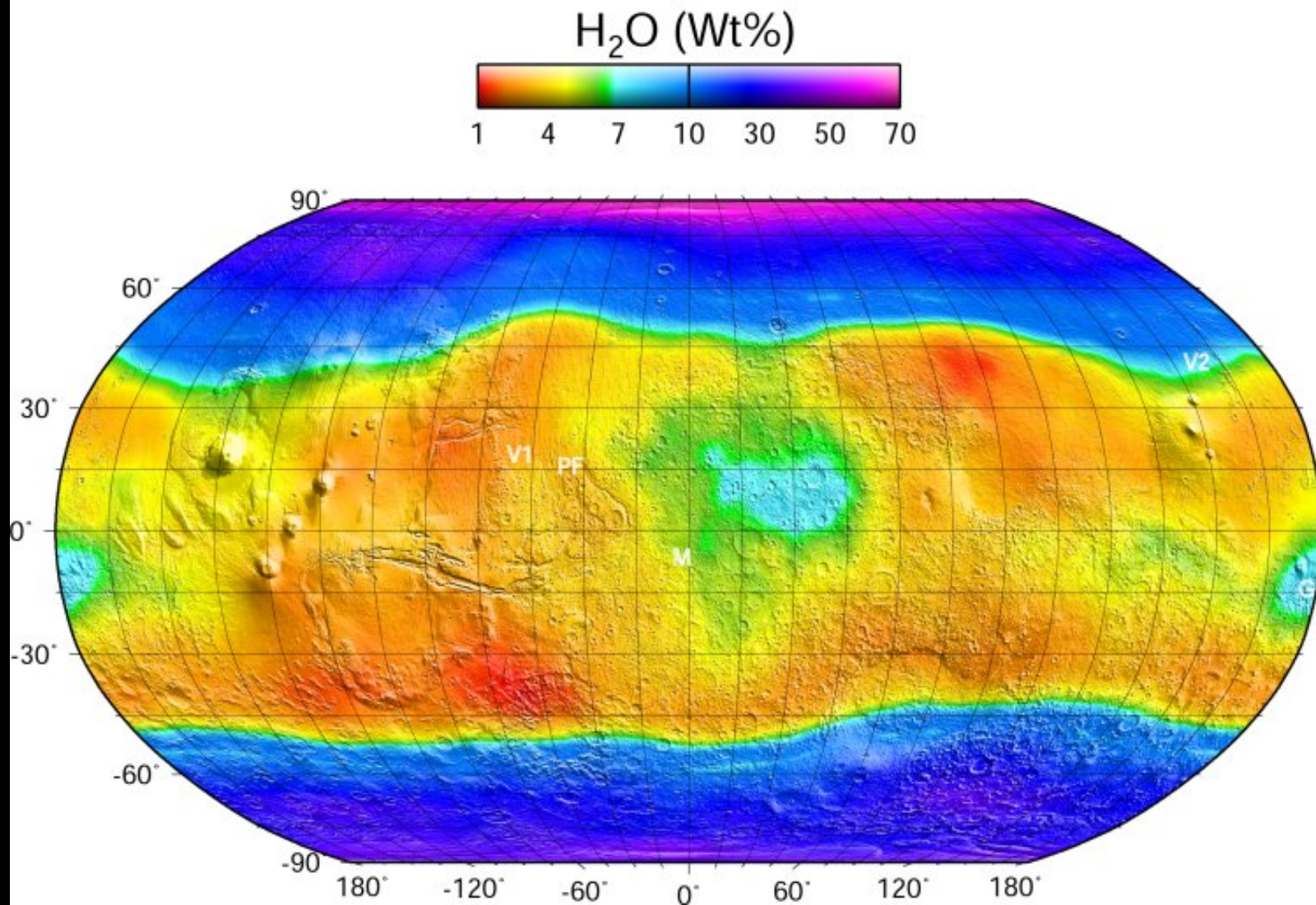
Dirty Ice or Icy Dirt?



Hydrogen Gamma Ray Map



Data from 2001 Mars Odyssey
Gamma Ray Spectrometer





Definitions of Soil Moisture Saturation



UNDER-SATURATED

Not enough water to fill all of the pore space of a given soil

SATURATED

Just the right amount of water to fill all of the pore space of a given soil

OVER-SATURATED

More water than can fit in the pore space of a given soil

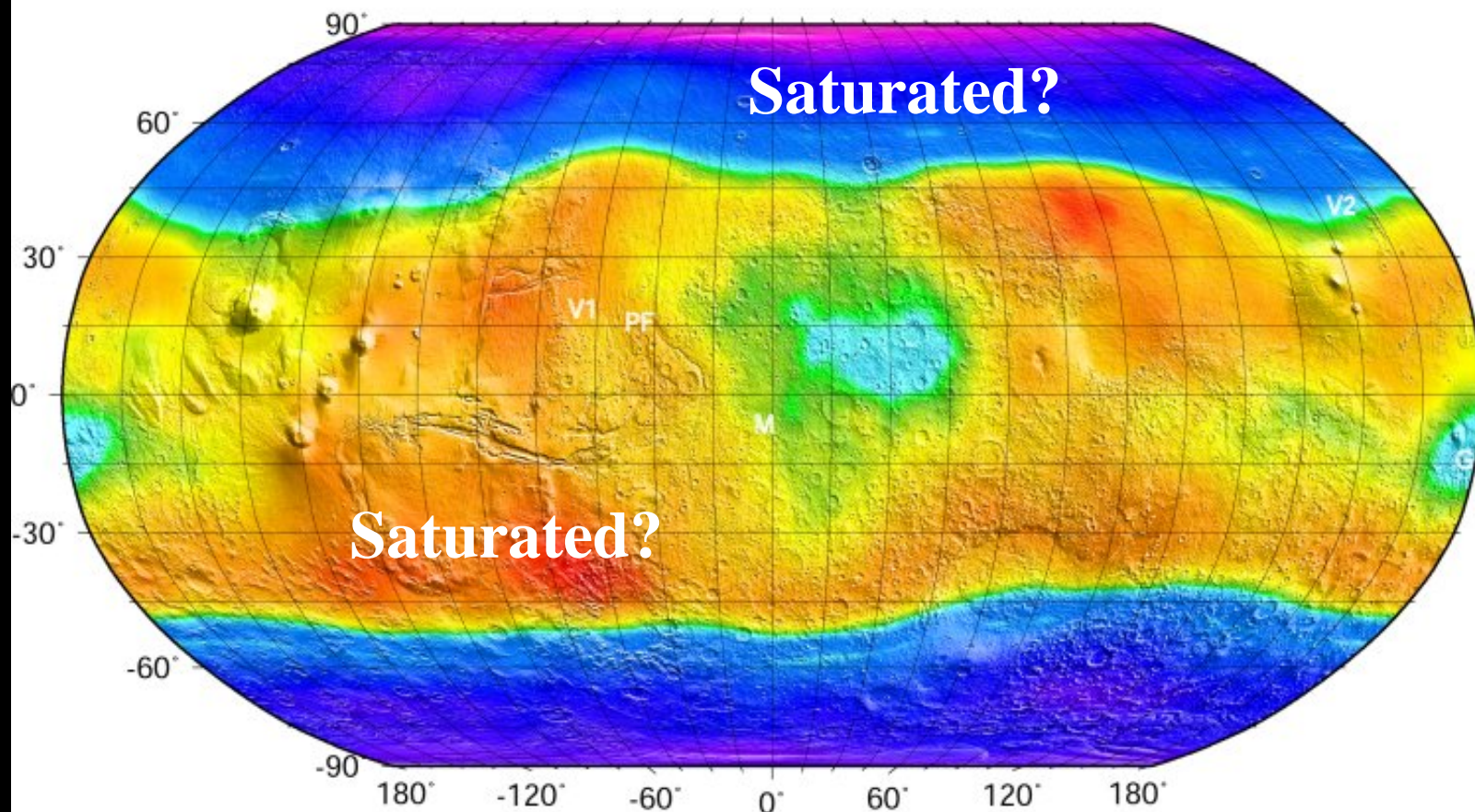


Hydrogen Gamma Ray Map



Data from 2001 Mars Odyssey
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H₂O (Wt%)

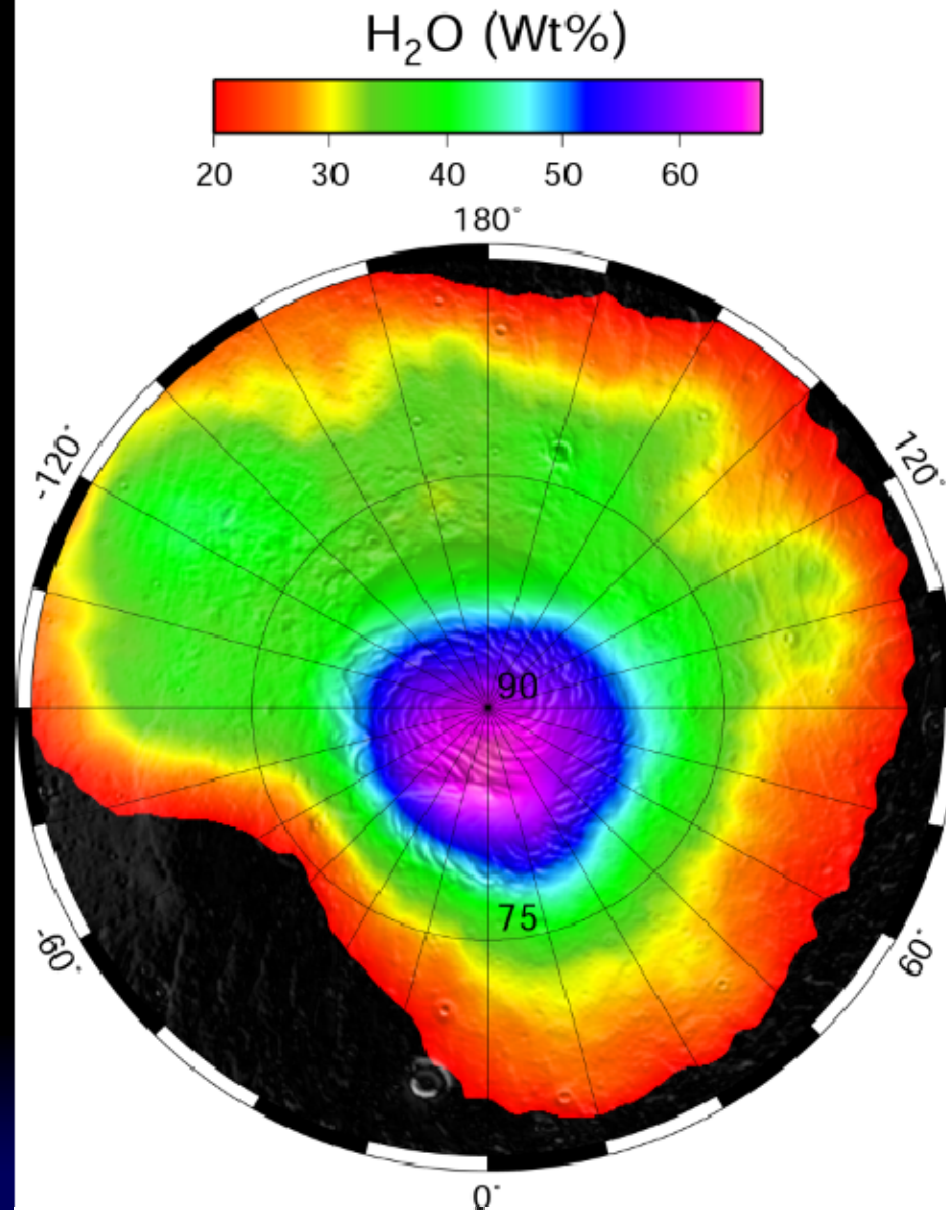




North Arctic of Mars



Data from 2001 Mars Odyssey Gamma Ray Spectrometer





Design your own experiment!

What is the maximum water weight % that typical dirt on Earth can hold?

$$\text{Water Weight \%} = \frac{\text{Water Weight}}{\text{Water Weight} + \text{Soil Weight}} \times 100\%$$



Water Estimates on Earth



Guess the water weight % for each of the surface layers below.



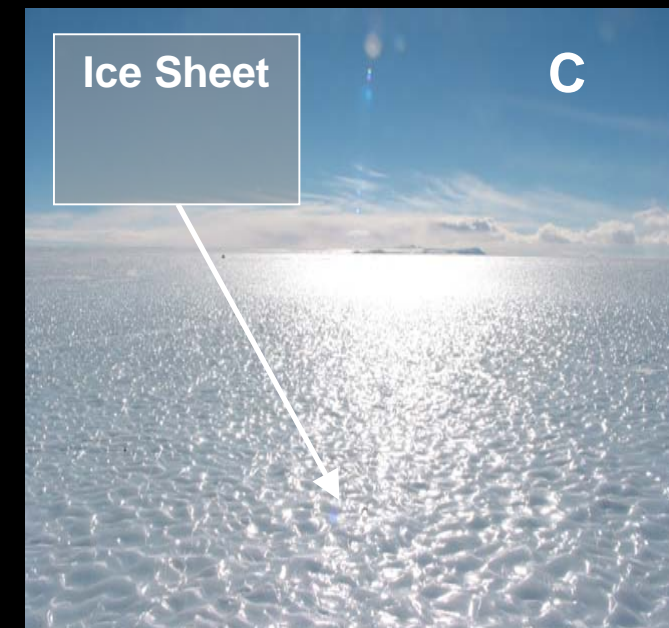
Mellon, et al., 2004, Icarus 169, p 337.

**Under-saturated
Dry Layer**



Mellon, et al., 2004, Icarus 169, p 337.

**Saturated
Permafrost Layer**



Provided by Dante Lauretta, 2003

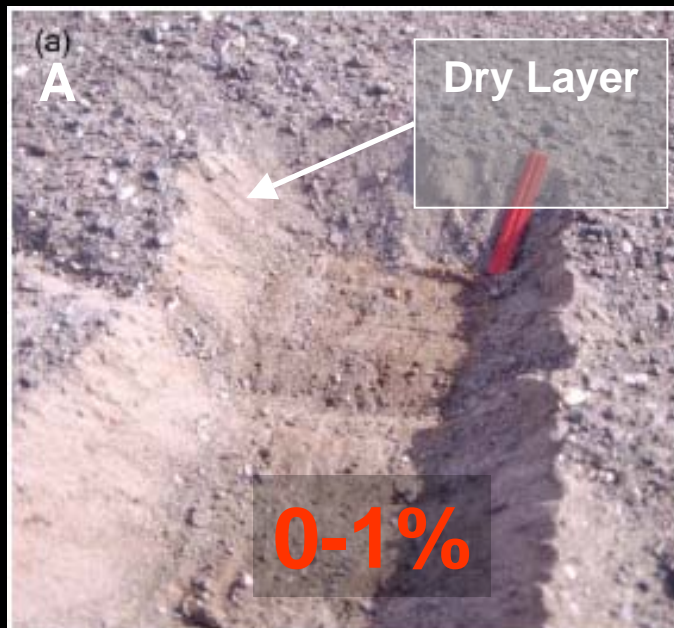
**Over-saturated
Ice Sheet**



Water Estimates on Earth



Approximate water weight % for each of the surface layers below.



Mellon, et al., 2004, Icarus 169, p 337.

**Under-saturated
Dry Layer**



Mellon, et al., 2004, Icarus 169, p 337.

**Saturated
Permafrost Layer**

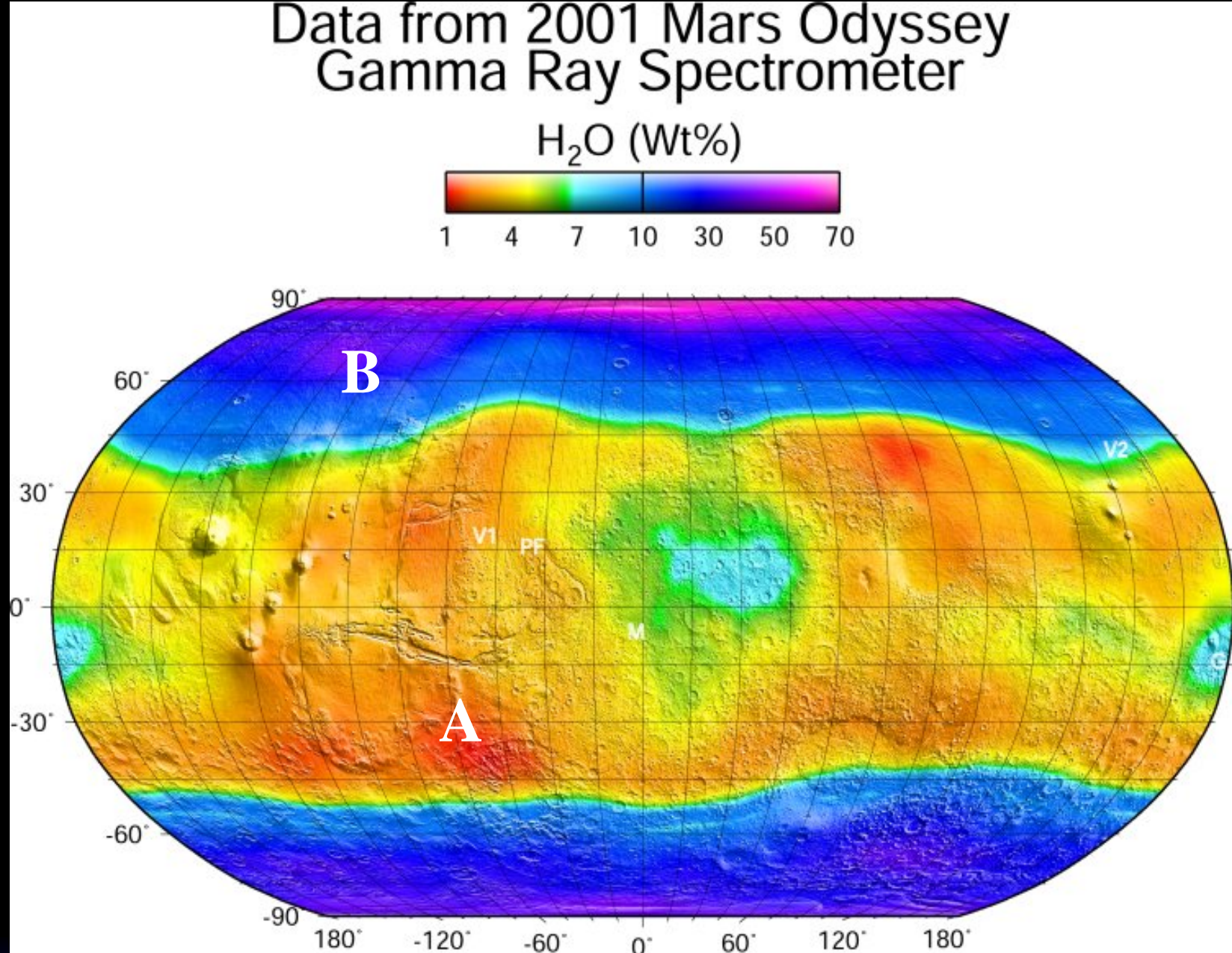


Provided by Dante Lauretta, 2003

**Over-saturated
Ice Sheet**



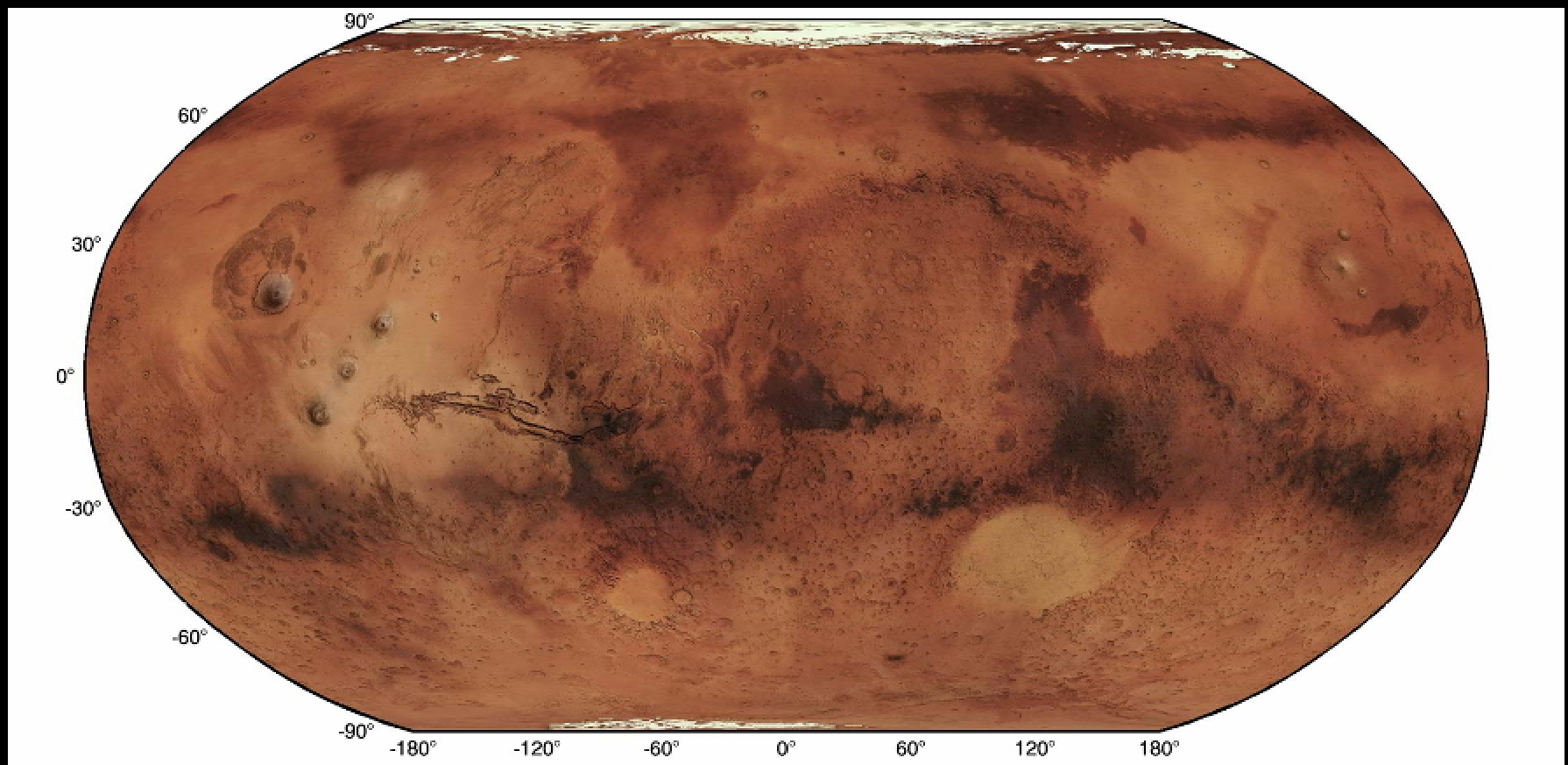
Water Estimates on Mars



Frost-free Map of Water at Near Surface of Mars



Visible Image of Mars



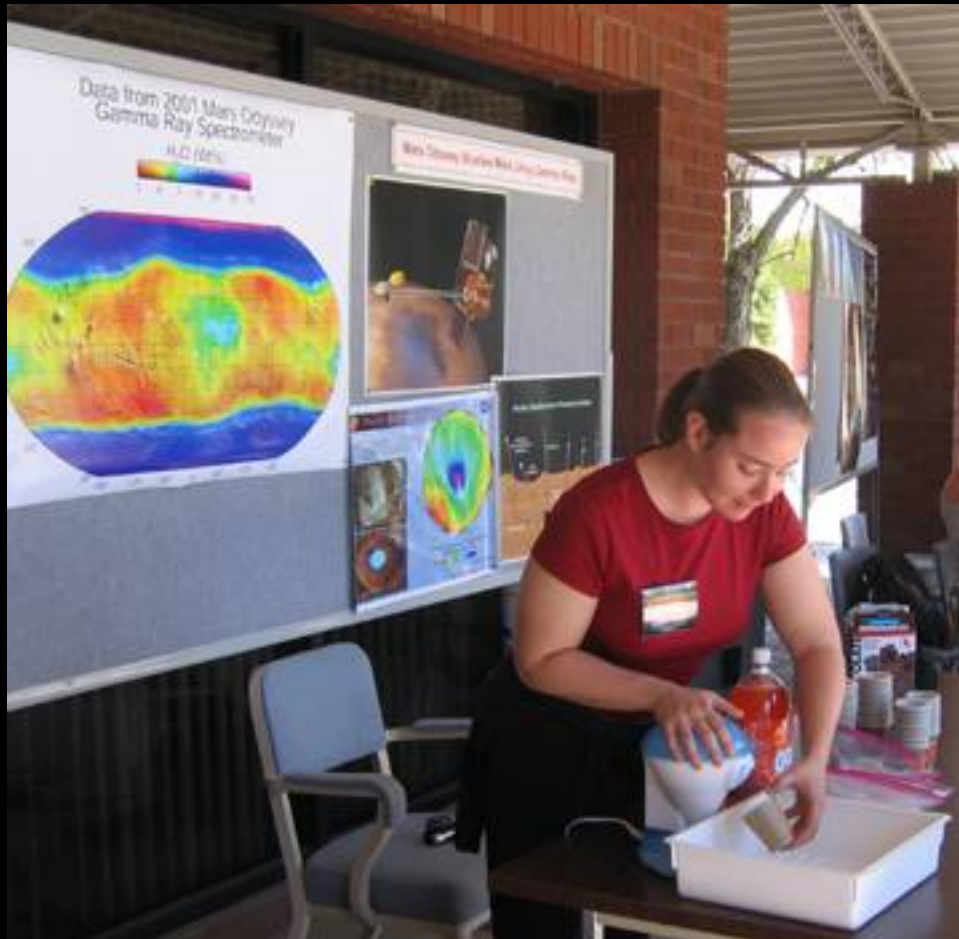


“Dirty Ice” Cones

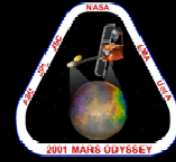


Recipe:

- Shaved ice
- Crushed graham crackers or cookies
- Syrup (optional)



Water on Mars



Dirty Ice or Icy Dirt?